APPENDIX M

VISUAL ANALYSIS TECHNICAL MEMORANDUM

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Technical Memorandum

Date:	Sunday, April 13, 2014		
Project:	N-12 Niobrara East and West EIS	Job No.	84534
To:	Project File		
From:	HDR		
Subject:	Visual Analysis		

I. Introduction

The U.S. Army Corps of Engineers (Corps) is preparing an environmental impact statement (EIS) for the proposed reconstruction of the Nebraska Highway 12 (N-12) roadway east and west of the Village of Niobrara (Niobrara), Nebraska (Project). The Corps is the lead federal agency for compliance with the National Environmental Policy Act (NEPA).

The purpose of this technical memorandum is to characterize the existing conditions and to examine potential effects of the Project and alternatives on visual resources. The information presented in this Technical Memorandum is used to describe the existing conditions and associated impacts on alternatives carried forward for analysis in the N-12 Draft EIS. This technical memorandum has been developed prior to completion of alternative screening. Therefore, the full range of alternatives has been evaluated. Detailed information on the purpose of and need for the Project and on the alternatives carried forward for analysis is provided in the N-12 Draft EIS. The range of alternatives evaluated in this technical memorandum are[1]:

- No Action – Section 404 permit denied; new roadway not constructed
- Alternative A1 – Elevation raise on the existing N-12 alignment
- Alternative A2 – Elevation raise parallel to the existing N-12 alignment
- Alternative A3 – New roadway along the base of the Missouri River bluffs
- Alternative A4 – Same alignment as Alternative A2 but with 3.6 miles of bridges
- Alternative A7 – Same alignment as Alternative A3 but with 1.8 miles of bridges incorporated
- Alternative B1 – New roadway along the top of the Missouri River bluffs

[1] Alternatives A5 and A6 were developed as part of the bridge alternative refinement process. They were iterations of the same concept, that is, an elevated roadway following Alternative A2 alignment and Alternative A3 alignment. Due to various factors, these alternatives were not advanced. Alternatives A4 and A7 represent the elevated roadway alternatives on the Alternative A2 and Alternative A3 alignments. In addition, Alternative B2 (south of Bluffs) was eliminated from detailed analysis because it has no distinct advantages or distinguishing features from those of Alternative B1 and the east segment of B2 was determined not logistically practicable.

A maximum bridge alternative (the same as Alternative A2 but with 5.2 miles of bridges incorporated) will be separately evaluated solely for documentation purposes for the administrative record.

II. Affected Environment

Visual landscape characteristics are the observed physical features of the land combined with the sensitivity of the landscape setting that affect the aesthetic value of an environment. Physical features can be natural, such as trees or rivers, or manmade, such as roadways and utility poles. They also can be permanent, such as a house, or temporary, such as a moving vehicle. A variety of natural features, manmade elements, and types of land use contribute to the visual resources of an area. The characteristics of the existing visual landscape were examined to assess how the Project might affect viewers' perceptions of their surroundings. The analysis includes the Study Area and the surrounding viewshed from the bluffs on either side of the Missouri River.

In the Study Area, the Missouri River flows relatively unrestricted between Nebraska and South Dakota through a river valley 1 to 2 miles wide which is flanked by sheer chalkstone bluffs and rolling, loess-covered hills. The meandering river ranges from a few inches to over 30 feet deep as the braided channel winds among willow and cottonwood covered islands and shifting sandbars. Near its confluence with the sediment-laden Niobrara River, extensive emergent wetlands form a complex of intertwined channels which present a contrast to other reaches of the Missouri River. The surrounding landscape transitions from riparian cottonwood forests to grasslands and cedar-dominated bluffs. Scattered farmsteads dot the undulating hills within an undeveloped rural landscape predominantly in pastures which evoke the vast original prairies. The combination of landforms, stream channels, and plant communities in the Study Area provide a rare glimpse of the natural conditions encountered by early inhabitants of the area.

The Missouri River was a principle highway and commerce route from the times of the Paleo-Indians through later tribes such as the Mandan, Sioux, Omaha, and Ponca. The importance of the river as a travel route was well documented by the Corps of Discovery Expedition. Today the Missouri River is also valued for recreational purposes. Recreational users are sensitive to the aesthetic conditions of surrounding landscapes. N-12 provides views of the Missouri and Niobrara Rivers from the road and public overlooks. The Niobrara State Park and Chief Standing Bear Bridge Overlooks reveal sweeping vistas within the Study Area. N-12 is a manmade element within the visual landscape both as observed from the river and from elsewhere along its route and public overlooks.

Within the Study Area, the National Park Service (NPS) administers the Missouri National Recreational River (MNRR) and the Lewis and Clark National Historic Trail. The NPS has a responsibility under the Organic Act (16 United States Code [USC] 1) to conserve the scenery of these congressionally designated areas for the enjoyment of future generations. In addition, MNRR and the Lewis and Clark National Historic Trail each have individual visual resource management objectives stemming from the legislation under which they were created.

The MNRR was established under the Wild and Scenic Rivers Act in 1978 along the 59-mile reach from Gavins Point Dam to Ponca, Nebraska. The 39-mile reach of the Missouri River from Fort Randall Dam to Running Water, South Dakota, and the lower 20 miles of the Niobrara River and its tributary Verdigre Creek were added in 1991. While much of the Missouri River valley has been heavily impacted by humans, the portion of the river system within the Study Area presents a more unaltered appearance. It exemplifies the scenic resources that are highly important along this segment of the MNRR.

The Lewis and Clark National Historic Trail was established by Congress in an amendment to the National Trails System Act in 1978 (16 USC 1244(a)(6)). National historic trails follow as closely as possible the original travel routes of historic significance, and have as their purpose the identification and protection of the route, its historic remnants and its artifacts for public use and enjoyment. The setting or scenery surrounding historic trails contribute significantly to the visitor experience. The Corps of Discovery followed the Missouri River on their outbound and return journey. In the Study Area, the Lewis and Clark National Historic Trail is a water-based trail along the Missouri River and N-12 is the designated auto tour route. Visitors following the Trail on the Missouri River or on N-12 are able to access an uncrowded landscape that provides a sense of isolation reminiscent of that experienced by Lewis and Clark.

In 1999, the Nebraska Scenic Byways Program established a 231-mile section of N-12 from South Sioux City to Valentine as the Outlaw Trail Scenic Byway. As its name suggests, the Outlaw Trail Scenic Byway has a rich Old West history, including rumors that outlaws frequented this area.

Attractions along the Outlaw Trail Scenic Byway include the Missouri River, state recreation areas, Lewis and Clark Lake, wildlife viewing, and other recreational opportunities (Nebraska Department of Economic Development 2008). In addition, the National Scenic Byways Program was established under the Intermodal Surface Transportation Efficiency Act of 1991 (23 USC 162). Under this program, the U.S. Secretary of Transportation recognizes certain roads as National Scenic Byways based on their archaeological, cultural, historic, natural, recreational, and scenic qualities. The Outlaw Trail is one of 151 such designated byways in 46 states (Federal Highway Administration 2007).

III. Methodology of Impact Analysis

A. HDR Visual Renderings

HDR created visual renderings from eight key observation points, as selected by NPS. The key observation points are (see Attachment A):

1. Bazile Creek Wildlife Management Area
2. Missouri River Channel East
3. Missouri River Channel West
4. Running Water (boat access)
5. Chief Standing Bear Bridge East
6. Chief Standing Bear Bridge West

7. Niobrara State Park Group Lodge
8. Niobrara State Park High Point

Data is imported in two-dimensional (2D) format, three-dimensional (3D) format, and geographic information system (GIS) data that is located in state plane coordinates. Models and/or schematics are used in .DGN or .CAD formats. Files are imported into 3ds Max software, where all data is aligned according to the state plane coordinates.

To create the 3D models, HDR used the following process:

1. To create the existing terrain model for the Niobrara area, a mixture of high-detail Light Detection and Ranging (LIDAR) data (for the areas near the roads) and lower detail National Elevation Dataset (NED) data were used to develop the 3D contours (for the areas farther away).One foot aerial imagery for these data was used as well.
2. The three road alignments were developed in InRoads from the project design data. These models included cuts and fills.
3. The alignments were then imported into 3ds Max, where the terrain and alignments were merged. Three different terrain meshes, one for each road were developed. Since the new alignments had cuts and fills, any overlapping contours of the existing terrain were deleted, and the two models were then able to merge without any issue.
4. Global Positioning System (GPS) points from photo locations and camera lens information from photographs were utilized within 3ds Max to replicate physical camera view. Triangulation techniques were then used to match photographs with DTM/terrain meshes.

After creating the 3D model, 3D modeling programs (3ds Max and Vue) were used to render out the base terrain and road. From here, renders were developed to create an image that called out what portions of the roads were visible in each view.

The terrain's aerial imagery, when viewed up close, was of very poor quality, and did not include details like grass, rocks, roads, or sky. To compensate for this, close-up details in Adobe Photoshop were added, using site photos taken by HDR. It did not affect the visibility of the roads in any way, or alter the accuracy. Other image alterations, like color modification, were done in Photoshop.

The renders are presented in Attachment B.

B. NPS Criteria

To assess the visual impacts based on the renderings developed by HDR, NPS developed the following criteria to analyze the alternatives in a letter dated November 9, 2012 (see Attachment C).

High Impact = 3

Likely to cause a substantial long-term and adverse effect on scenic quality, an existing viewshed, or key observation point (KOP) due to the visual contrast between the proposed project and the existing landscape conditions.

Moderate Impact = 2

Likely to cause a noticeable but not substantial change in scenic quality due to the visual contrast between the proposed project and the existing landscape conditions. Such a change would be noticeable to a sensitive viewer, but not all viewers.

Low/No Impact = 1

Likely to cause no change or a negligible change in scenic quality due to the visual contrast between the proposed project and the existing landscape conditions.

C. NPS Visual Impact

Using its criteria, an interdisciplinary team of the MNRR and Lewis and Clark National Historic Trail staff assessed the visual impact of Alternatives A2, A3, and B1. It should be noted that the impacts are comparing the alternative to existing conditions, not one alternative to another. Their results are presented below:

Table 1.
Level of Visual Impact by Alternative

Key Observation Point	Alternative A2	Alternative A3	Alternative B1
Bazile Wildlife Management Area	2	1	1
Missouri River Channel East	1	1	3
Missouri River Channel West	1	1	3
Running Water	3	1	3
Chief Standing Bear Bridge East	3	1	3
Chief Standing Bear Bridge West	1	2	3
Niobrara State Park Group Lodge	1	1	3
Niobrara State Park High Point	1	1	2

D. Updates to the Vertical Alignments in 2014

In 2014, the Nebraska Department of Roads (NDOR) revised its alternatives to comply with the Corps' updated flood study in the N-12 Study Area. The updated vertical alignments would provide free board for a 1 percent chance exceedance flood event at the projected conditions 50 years in the future, including an additional 3.5 feet for wave

action where needed. There is an approximately 6 to 8 foot change in vertical alignment from the 2012 alignments for each of the alternatives that occur in the floodplain.

The update to the vertical alignments was reviewed to determine if they were of a magnitude that would require an update to the existing visual impact analysis completed in 2012.

The renderings of the four N-12 alternatives (Alternative A2, Alternative A3, Alternative B1, and existing conditions) were taken from a half mile or further away. The roads and their impact on the landscape were not readily visible until each option need was called out with colored highlights. Likewise, cars and semi-trucks were barely a few pixels wide in each render and were circled and called out as well to indicate that they were on the roads. Given the viewshed distance, and the relative size of the road and the vehicles that travel on it in the renders, a difference of 6 to 8 feet in the vertical alignments of the alternatives will not make any visible change to the current renders.

IV. References

Federal Highway Administration. 2007. "History of the Program." *National Scenic Byways Program*. Accessed January 21, 2010. http://www.bywaysonline.org/program/history.html.

Nebraska Department of Economic Development. 2008. "Niobrara State Park." Division of Travel and Tourism. Accessed November 17, 2008. http://www.visitnebraska.gov/component/myplanner/detail/43/2000121.

ATTACHMENT A

KEY OBSERVATION POINTS

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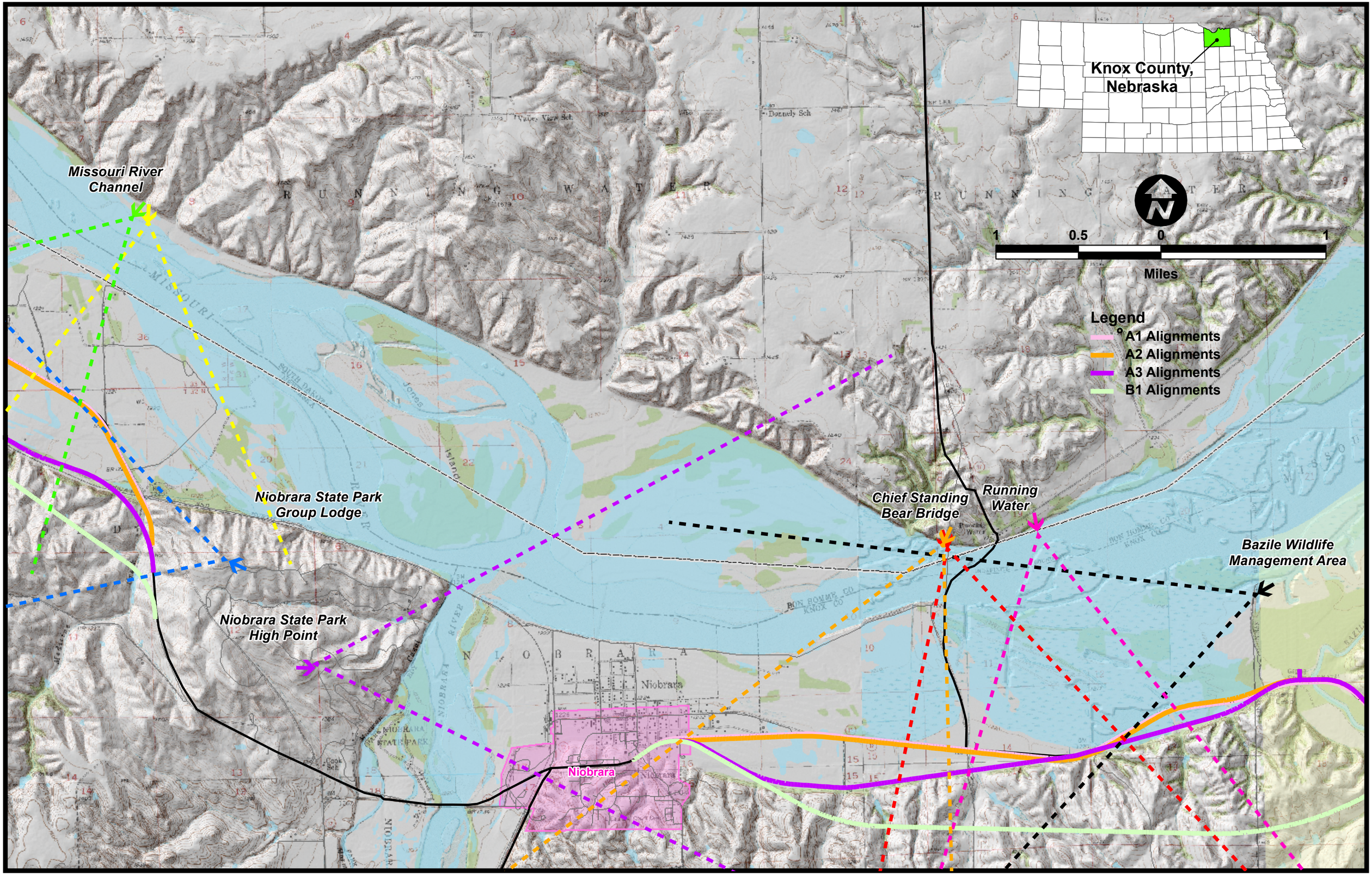
Missouri River
Channel
Niobrara State Park
Group Lodge
Niobrara State Park
High Point
Chief Standing
Bear Bridge
Running
Water
Bazile Wildlife
Management Area
Niobrara
Knox County,
Nebraska
1
0.5
0
1
Miles
Legend
A1 Alignments
A2 Alignments
A3 Alignments
B1 Alignments

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ATTACHMENT B

VISUAL RENDERINGS

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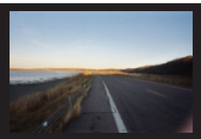
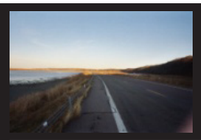
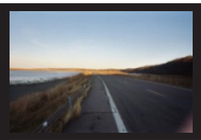



NEBRASKA
12
N-12 Niobrara East & West

View from Bazile Wildlife Mangement Area
Existing Conditions - Callout



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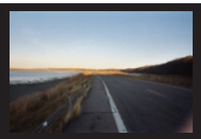
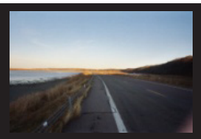
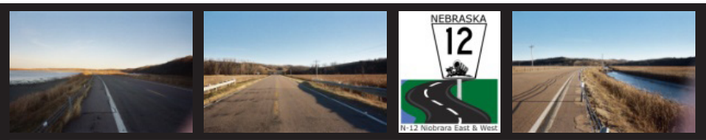


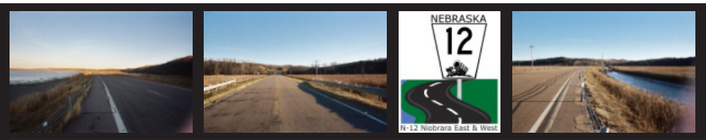
View from Bazile Wildlife Mangement Area
Alternative A2 - Callout



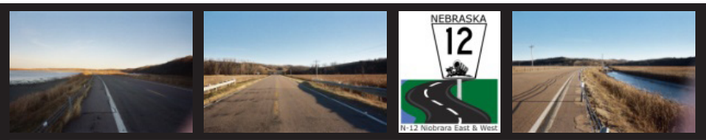
View from Bazile Wildlife Mangement Area
Alternative A2



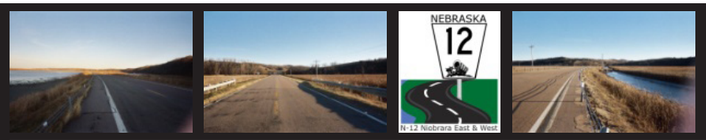
View from Bazile Wildlife Mangement Area
Alternative A3 - Callout



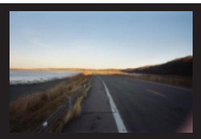
View from Bazile Wildlife Mangement Area
Alternative A3



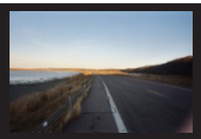
View from Bazile Wildlife Mangement Area
Alternative B1 - Callout



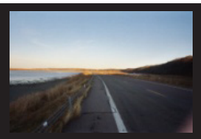
View from Bazile Wildlife Mangement Area
Alternative B1



View from Missouri River Channel East
Existing Conditions - Callout



View from Missouri River Channel East
Existing Conditions



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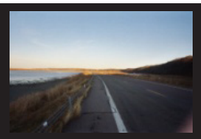

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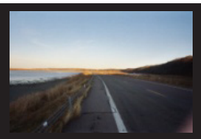
Alternative A2



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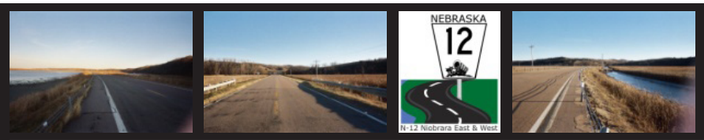
Alternative A3 - Callout



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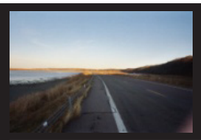
Alternative A3



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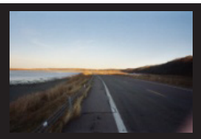
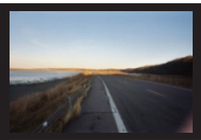


View from Missouri River Channel East
Alternative B1



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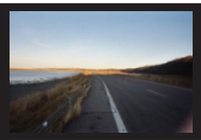

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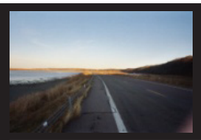
Existing Conditions



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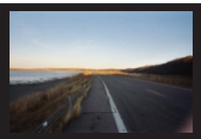

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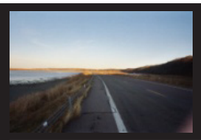
Alternative A2



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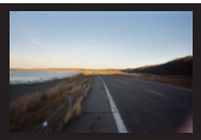

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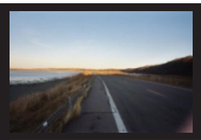

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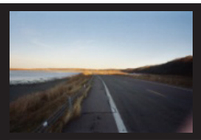

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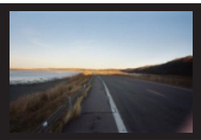
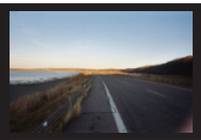
Alternative B1



View from Running Water
Existing Conditions - Callout



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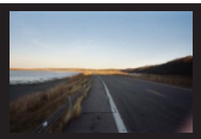
Existing Conditions



View from Running Water
Alternative A2 - Callout